



# Why All Counter-Evidence to the Critical Period Hypothesis in Second Language Acquisition Is not Equal or Problematic

Jason Rothman\*

*University of Iowa*

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## Abstract

That adult and child language acquisitions differ in route and outcome is observable. Notwithstanding, there is controversy as to what this observation means for the Critical Period Hypothesis' (CPH) application to adult second language acquisition (SLA). As most versions of the CPH applied to SLA claim that differences result from maturational effects on in-born linguistic mechanisms, the CPH has many implications that are amendable to empirical investigation. To date, there is no shortage of literature claiming that the CPH applies or does not apply to normal adult SLA. Herein, I provide an epistemological discussion on the conceptual usefulness of the CPH in SLA (cf. Singleton 2005) coupled with a review of Long's (2005) evaluation of much available relevant research. Crucially, I review studies that Long did not consider and conclude differently that there is no critical/sensitive period for L2 syntactic and semantic acquisition.

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## 1. Introduction

Whereas the expectation of normal child language acquisition is uniform with a virtual guarantee of success, typical adult language acquisition is characterized by various degrees of non-convergence and variability. At a very descriptive level, these facts meet with little controversy as such would be to ignore what mere observation demonstrates. That is to say, irrespective of the position that individual researchers assume with respect to what typical first language (L1) and adult second language (L2) differences in developmental sequence and ultimate attainment mean for cognitive theories of adult second language acquisition (SLA), it is important to be clear that no one denies their reality. In fact, there has never been a serious theory of adult SLA claiming the overall processes and outcomes to be identical. As researchers, however, we must explain beyond mere description and in light of all the evidence determine whether or not the most obvious account – the one that integrates description and explanation – is, in fact, the most adequate one.

In the present case, this would mean that the descriptive observation of L1/L2 differences equates to the loss of implicit linguistic acquisition

ability in adulthood; that adult L2 learners acquire language explicitly and in this sense decisively different than children (see, for example, Bley-Vroman 1989, 1990; Long 1990, 2005; Meisel 1997; DeKeyser 2000, 2003; Ullman 2001; Paradis 2004).<sup>1</sup> Such a position is captured by the 'Critical Period Hypothesis' (CPH) (Penfield and Roberts 1959; Lenneberg 1967) extension to the domain of SLA. There is no reason to believe a priori that observation would not coincide with the most adequate explanation, but one cannot take for granted that such would automatically be the case either. In other words, it is quite reasonable to presume that a strict interpretation of the CPH applied to SLA is accurate (see Birdsong 1999; Han 2004; Herschensohn 2007 for details on the debate). Nevertheless, it is of no small consequence to point out that there is no such agreement among scholars who investigate SLA. In part, this has to do with the imprecision of the term 'critical period' itself in that it is not immediately clear what one intends when they make reference to it (see Section 2 below). Even so, it is clear that a strict interpretation of the CPH universally entails a maturational decline/cessation for innate linguistic acquisition ability. Assuming a cognitive view of language, this means that (whatever) implicit cognitive mechanisms – which I take to be Universal Grammar (UG) (see Chomsky 2007 for a review of this position) – drive primary language acquisition become inaccessible to adult learners.

Schwartz (1986) argues that in the absence of unassailable evidence to the contrary, the null hypothesis for SLA is that an L2 is acquired via the same domain-specific cognitive mechanisms as child L1 and that the mental constitution of L2 grammars is thus not predestined to be fundamentally different. The question of what satisfies the burden of uncontroversial evidence in this respect rests at the core of the longstanding disagreement as to whether or not there is a critical period for normal adult SLA. In all scientific inquiry, it is generally accepted that theoretical positions are only worthy of serious consideration if they are verifiable/falsifiable. Applied to language acquisition research specifically, proposals must make predictions that are amendable to experimental scrutiny to verify their tenability in the case that their predictions are borne out or to fail at such a task when their predications are reliably unsubstantiated experimentally.

Researchers who challenge a strict interpretation of the CPH applying to SLA do so in light of evidence that they maintain demonstrates that some key predications of the CPH are not substantiated. The concept of an absolute critical period (e.g. Lenneberg 1967; Hyltenstam 1992) or even multiple sensitive periods (e.g. Oyama 1976; Long 1990; Lee and Schachter 1997) affecting various linguistic modules asymmetrically makes definitive claims about the very ability of an adult learner past a particular age to acquire certain domains of L2 grammar in the same way as children learners. In the same way as children is an important distinction, one that is equally difficult to prove in either the positive or negative sense, as it is well-known that different underlying mental representations can yield what appear on

the surface as equal structures. That is to say, it is possible for domain-general (explicit) learning to provide an analysis that yields what appear to be the same results as domain-specific (implicit) learning in many cases, but crucially not in all cases. Any version of the CPH that claims that adults lose the ability to acquire syntax, for example, in the way children do, is forced to take the position that apparent L2 knowledge of target syntactic properties absent from or different in the L1 were learned explicitly and are therefore represented differently in the adult learner's L2 mental grammar. This assumption, however, is not without its consequences. Among other things, such a position predicts that properties that cluster together in L1 acquisition must be acquired on a one-to-one basis<sup>2</sup> (Liceras 1997) and that related semantic knowledge that falls out from the acquisition of new L2 syntactic properties will never be acquired. In other words, L2 poverty-of-the-stimulus (POS) phenomena<sup>3</sup> should never be attested to, because, by definition, true POS are properties that cannot be inducted on the basis of available input alone given an absence of relevant data from the input, are not taught or otherwise known explicitly by the learner and, in the case of L2 acquisition, are not transferable from the L1. If L2 learners first exposed to an L2 past a particular age – whatever the end of the offset of the critical/sensitive period is hypothesized to be – can reliably be shown to acquire new L2 POS morphosyntactic and semantic properties, then there is little hope that syntax and semantics suffer from a critical or even sensitive period.<sup>4</sup>

Long (2005) reviewed an impressive amount of available literature relevant to the CPH debate in adult SLA. The goal of his article was to point out no less than nine shortcomings of so-called counter-evidence to the CPH that, individually or coupled together, question the reliability of such research and/or the tenability of the claims they make. Long (2005: 289) maintains that there is an early sensitive period for phonology (between 6 and 12), a sensitive period for lexical and collocational abilities (as early as 6, but absolute by the mid-teens) as well as a later sensitive period for morphology and syntax ending in the mid-teenage years. The points he raises, which I review in Section 3, are applicable to much of the research he cites. As we will discuss, some of the points are unavoidable confounds given the nature of SLA investigation, others are consequences of paradigmatic differences in theoretical assumptions, while others are globally germane and should be taken into consideration by all SLA researchers. Despite Long's (2005) invaluable contribution, I argue that his nine points do not apply to all counter-evidence to the CPH. In fact, I argue that not all counter-evidence is equal. Long's points do not even attempt to address the availability of L2 POS knowledge cited by a growing number of studies since the 1990s (see Gregg 1996; Dekydtspotter et al. 1997; Pérez-Leroux and Glass 1997, 1999; Kanno 1998 for earlier work and see Slabakova 2006a; Rothman and Iverson 2008 for a review of the most contemporary studies). If there is a critical/sensitive period for syntax, adults past a particular age

should have no recourse to demonstrate knowledge of L2 POS in syntax and related semantics precisely because they have supposedly lost the ability to acquire syntax in the domain-specific implicit manner as children do.

Insofar as L2 POS effects are reliably documented for syntax and semantics, such evidence is, at first glance, contradictory to the observation that L1 and L2 acquisition outcomes are saliently different. Such differences must be explained in a principled way by all SLA theories, especially those claiming that there is no critical/sensitive period for some linguistic modules. And so, this article will also detail some contemporary accounts within generative SLA that attempt to explain L1/L2 differences in a principled and predictable way, complementing the position that syntax and semantics do not suffer from an inevitable age-related maturational critical period.

This article is structured in the following manner. Section 2 concisely reviews different conceptualizations of the CPH applied to SLA, highlighting important similarities and differences. Section 3 critically reviews Long's nine points that he claims effectively negate the value of all counter-evidence to the CPH. Section 4 argues that there is crucial evidence that Long cannot account for and reviews specific L2 studies that provide robust L2 POS evidence. Section 5 discusses the implications of this, while section 6 provides a summarizing conclusion.

## *2. The Critical Period Hypothesis in Second Language Acquisition: One Hypothesis or Many?*

The concept of a 'critical period' is not unique to language acquisition, but is a routine term in biology referring to a maturational window of time during which some crucial external experience reaches its peak effect on development or learning, resulting in normal behavior attuned to the particular environment to which the organism has been exposed. If the organism is exposed to such external stimuli before but not during this critical time period, or not until after this time period lapses, the same experience will have only a reduced effect or, in extreme cases, no effect at all (Newport 2002: 737). The definition of a critical period for language acquisition in the context of adult learners who have already experienced a normal L1 development has always been litigious. Over the course of five decades, a single working definition has yet to be agreed upon, leaving little hope of such happening in the near future. In light of this, Singleton (2005) questions the usefulness of the very concept itself, maintaining that since there is no reliable, constant definition of the 'critical period' for SLA, arguments for or against it are effectively meaningless. Without a universal definition, evidence that is claimed to support or refute it remains inherently open to convenient re-interpretation, which is not only epistemologically unsound, but also futile in terms of practicality. In this section, we concisely – though non-exhaustively – review relevant literature which conceptualizes critical periods differently in SLA (see

Han 2004; Singleton and Ryan 2004; Herschensohn 2007 for a more detailed review).

While some researchers have proposed a critical period for language acquisition affecting all components of the linguistic system (e.g. Lenneberg 1967; Long 1990, 2005; Hyltenstam 1992, Hyltenstam and Abrahamsson 2000), several researchers maintain that there are critical/sensitive periods for specific linguistic sub-modules, but not all (or none at all). Dunkel and Pillet (1957) were among the first to allude to a critical period for adult acquisition, specifically for phonetics and phonology. This was later formalized linguistically by Fathman (1975) and Scovel (1988), who claimed pronunciation to be the sole linguistic capacity to show age effects due to its neuromuscular element (Scovel 1988). Others claim that there is a critical period only for innate linguistic components (e.g. Bley-Vroman 1989; Schachter 1996; Meisel 1997; DeKeyser 2000; Ullman 2001; Paradis 2004), or for subparts of innate elements (e.g. Tsimpli and Roussou 1991; Hawkins and Chan 1997; Franceschina 2005; Hawkins 2005; Tsimpli and Dimitrakopoulou 2007). Still, others claim that there is a critical period effect for non-innate elements of language acquisition only (e.g. Flynn and Martohardjono 1995).<sup>5</sup>

Not only is there considerable disagreement about which modules, if any, the critical period affects, there is debate as to what a critical period is. Oyama (1976) first proposed an alternative to an absolute critical period, offering the notion of a sensitive or optimal period, specifically for phonology. Different than a critical period, which is a sudden, abrupt and absolute cessation, a sensitive period is conceived of as a gradual maturational-conditioned decline in ability/sensitivity that culminates in similar effects as a critical period. Several researchers have adopted and extended Oyama's idea of a sensitive period, including Lee and Schachter (1997) and Long (1990), who maintain that there are multiple sensitive periods affecting different linguistic modules asymmetrically in time.

Even in the case of agreement that critical or sensitive periods are a reality, another source of dispute involves the cause of a critical/sensitive period. Proposals range from the neuro-biological and cognitive-developmental to the affective-motivational. Causes falling under the heading of neuro-biological find their roots in Penfield and Roberts (1959) who cite a reduction of cerebral plasticity. Others, such as Lenneberg (1967) and Molfese (1977), rely on brain lateralization as an explanation, while localization and a differentiation in spatial representation (Wattendorf et al. 2001) are also presented as possible causes. DeKeyser (2003), Paradis (2004) and Ullman (2001) join some generative theorists in citing cognitive-developmental maturation responsible for the so-called loss of implicit learning capabilities (although they do not conceive of implicit acquisition mechanisms of UG as generative linguists do, they do conceive of linguistic acquisition as human-specific characteristics that have a special cognitive basis). Alternatively, affective and motivational factors are proposed as a cause by others (e.g., Schumann 1978; Krashen 1985).

A final source of disagreement stems from the many different accounts of length of the critical period. Researchers favoring sensitive periods, as opposed to an absolute critical period, have varying views on the onset and offset of sensitive periods for language learning and this can vary by the linguistic domain to which it is applied. Some researchers maintain that there are different phases of offsets for phonetics, phonology, syntax, morphosyntax, and semantics or that sensitive periods apply to some, but not all of these modular components. In Singleton's words, 'to speak in terms of the Critical Period Hypothesis is misleading, since there is a vast amount of variation in the way in which the critical period for language acquisition is understood' (2005: 269). Singleton takes the position that in light of critical variation and inconsistencies among the numerous accounts of CPH for SLA, the imprecision that emerges effectively undermines the utility of such a notion in the first place. With this in mind, it becomes extremely difficult to reliably know what a researcher might mean when he claims to support or reject the CPH for SLA (cf. Long 2005; Singleton 2005). Notwithstanding, there are commonalities to all accounts of critical/sensitive periods for SLA despite the opaque nature of their sources, the domain(s) they come to affect (or not) and their onsets/offsets when one considers them from a purely cognitive-linguistic perspective. By all such accounts, a critical/sensitive period relates to a maturational consequence. Thus, for whichever domains they are argued to affect, their effects are (a) cognitively based, (b) thus unavoidable, and (c) surface in the loss of ability, resulting in a can vs. cannot dichotomy. This fact makes the predictions of the CPH in its many forms amendable to empirical verification/falsification. With this in mind, the next sections review available studies, starting with Long's (2005) review and critique of so-called counter-evidence to the CPH.

### *3. Counter-Evidence to the Critical Period Hypothesis and Long's (2005) Nine Points*

At the crux of L2-CPH research is the desire to prove or dispel the proposal that the observable differences between child and adult language learners can be explained as a function of maturational differences to the biological mechanisms for language learning. Flege (1987) and others have argued that the CPH is not really a testable hypothesis, but more an a priori assumption with respect to the basis for differences in child-adult linguistic success. This assertion, however, is not tenable as the many versions of the CPH make clear predictions (although not all approaches make the same predictions) about what an adult learner can and crucially cannot come to acquire from the target L2 and thus, like all scientific theories, are falsifiable. The pressing question, however, is what constitutes valid, unassailable evidence in favor of or counter-evidence against the CPH?

Adequately answering this question is of no small consequence. In effect, it would substantially narrow the gap between opposing theories of SLA and help determine which SLA theories are more explanatorily adequate than others. As is well-known, there is no shortage of studies that claim to provide evidence that supports or questions the many versions of the CPH. But how can it be that the whole of available research conspires to paint such an opaque picture, offering contradictory evidence that creates more questions than provides answers? After all, there is no real middle ground with respect to the CPH. That is, either particular linguistic modules suffer age-related developmental changes or they do not. Accordingly, it is important to highlight that reliable counter-evidence agreed upon by all would effectively be devastating to any strict version of the CPH. Even in this case, however, such a reality would not change the observable fact that children and adults differ in developmental sequence and ultimate attainment and that this must be adequately explained by all serious theories of SLA.

In a state-of-the-science review, Long (2005) makes a series of judicious observations with respect to the whole of L2-CPH research. Calling attention to the comparative fallacy of many of the available studies, he explains why it is difficult to derive a simple conclusion from complicated results, obtained via distinctive methods and analyzed under various, sometime mutually exclusive assumptions. Defending his (and many others') assertion that there are sensitive periods affecting phonology, syntax and morphology, which in all cases culminate by the end of young adulthood (mid-teens), Long details nine possible confounds of the counter-evidence to the CPH he reviews. Irrespective of whether or not the evidence I discuss in the next section is taken to be strong evidence against Long's overall argument, this fact would do little to diminish the validity and applicability of his points. In other words, the fact that I do not agree that all counter-evidence to the CPH, and crucially evidence Long does not directly address, can be accounted for via theoretical and methodological shortcomings does not mean that Long's points are any less legitimate and relevant to much of the data he critiques.

To effectively summarize these points here, I divide Long's nine points into two main subgroups under the labels of limitations and methodological flaws. What I label as limitations are, in my mind, more global concerns with respect to an individual researcher's assumptions at a higher level, whereas methodological flaws are internal to particular methodologies and analyses themselves. Long lists the following five shortcomings that I label limitations:

- (1) Confusion of rate and ultimate attainment. The fact that adults initially learn faster than children is quite different from claiming that the ultimate systems arrived at by both are equivalent or divergent. The CPH makes clear and thus testable predictions for ultimate convergence or lack thereof.

- (2) Inappropriate choice of subjects. It is extremely important that adult L2 subjects have truly passed the offset of the critical/sensitive period being tested, so as to not confound the results based on age of onset of acquisition. In the same vein, the context of acquisition is deterministic and thus important when choosing subjects. To exemplify, an important article by White and Genessee (1996) could be viewed as suffering from such flaws. In the context of their study, it could be argued that although most of the learners were first exposed significantly to the L2 in young adulthood, the extent to which French and English were not somewhat available to these speakers before the onset of the critical period is doubtful because they were from Québec, a Canadian province of considerable societal bilingualism. And so, the results that they provide, which demonstrate the possibility of full L2 convergence and thus robust counter-evidence for the CPH applied to SLA, become vulnerable to critique.
- (3) Measurement of age of onset. How the age of onset is measured is directly related to one's conception of what the age of onset is, and this varies considerably. Most authors believe it to be the moment of considerable, significant input. As can be immediately appreciated, such a definition is vague and thus leaves room for interpretation, which, in turn, invites criticism. It is not clear how much input is needed for the acquisition processes to commence and so even small amounts of pre-critical period input exposure is a factor that should be controlled for.
- (4) Assessment based on limited sample and/or 'language-like' behavior. No one would deny that the more data one has at his disposal the more reliable the generalizations that emerge from such data sets are. Much CPH counter-evidence, although not exclusively at all, comes from case studies of as little as one subject. On the one hand, it is impossible to make meaningful generalizations from such case studies, but they are an important tool, nonetheless (see Lardiere 2007 for rationale). Indeed, one must be cautious not to make over-generalizations from limited data; however, case studies provide significant and crucial counter-evidence for the CPH, as the prediction of the CPH should be applicable to all individual learners.
- (5) Inappropriate L1-L2 pairings. With respect to learnability consideration, especially if one assumes that L1 transfer occurs, language pairings are of great importance. From a formal linguistic perspective, this is especially true, as L1 transfer of a superset setting for a particular grammatical property could present a learnability obstacle for an L2 with a subset setting.<sup>6</sup> This is the case because the target input alone would not provide the type of negative evidence that would be needed to effectively unlearn an L1 property that one does not obtain in the L2 grammar. As such, the L1 transferred grammar would enable parsing of all the L2 sentences for such a domain without informing the learner that a new, smaller setting is required. For example, an English learner of L2 Spanish

could be predicted to acquire null-subjects more quickly than Hispanic learners of L2 English who might learn that null subjects are impossible in English. This is true since in the former case, acquiring a new L2 feature – re-setting this parameter from the subset to the superset – is less challenging based on available input than the unlearning of a superfluous L1 property – when the L1 grammar permits all L2 sentences.

Long asserts that the majority of studies claiming to provide counter-evidence to the CPH suffer from one or more of the above limitations. The extent to which this is true is of great importance as any one of these confounds questions the veracity of any conclusions drawn from them, especially claims related to the selection of appropriate subjects and its relationship to how the age of onset is measured. After all, if the learners were exposed to the target L2 before the end of the critical/sensitive period for the domain under investigation, then the results are unable to bring any real contribution to the debate at hand.

Even in the case that one or more of these confounds applies to any given study, however, it does not automatically imply that those results and/or claims would be invalidated. For example, while it is of good judgment to ponder possible effects of assessments based on limited samples and/or language-like behavior, this potential confound does not exclude the possibility that limited samples of linguistic behavior could truly be indicative of target competence knowledge. Of course, it is best to employ multiple and reliable measures of testing to ensure that limited samples are accurate depictions of underlying linguistic representation. Nevertheless, limited samples themselves do not equate to invalidation. Conversely, the same argument could and should be offered for the opposite effect; that being the use of limited samples of non-target-like behavior as evidence for what should pass as evidence in favor of the CPH in any particular domain.

The four remaining points that Long posits and demonstrates as valid in his review of many studies include the following:

- (6) Leading instructions to raters. When studies use raters, particularly in phonological CPH studies, the analysis has an inherent level of subjectivity. The claim is that instruction to raters could lead them to render evaluations, albeit inadvertently, that favor the point of view of the researcher.
- (7) Use of markedly non-native samples making near-native samples more likely to sound native to raters. There is no question that such a practice does little for the reliability of such measures. When samples are juxtaposed markedly non-native samples, the exemplary ones will most certainly begin to stand out as appearing more native-like. However, the goal is to measure them against actual native speech exemplars and determine the extent to which the L2 speech is or is not reliably differentiated from native speaker samples.

- (8) Unreliable or invalid measures. This is a problem of all empirically based research. Reliability is extremely important and for this reason studies that seek to test methodology itself are extremely important. To make any definitive claims, research methodology must be sound and verifiably reliable. This of course is true of counter-evidence and supportive evidence to the CPH alike.
- (9) Faulty interpretation of statistical patterns. Statistics are a necessary part of all empirical investigations; however, not all empirical studies are amendable to the same type of statistics. For example, ANOVAs and t-tests require a minimum number of group participants to offer any meaningful results. Moreover, the interpretation of appropriately done statistics can vary as well based on the points that are being made and the individual researcher's interpretation of what is and is not statistically significant. Not inconsequentially, statistics alone are often insufficient to shed light on the whole picture. For example, while something might be statistically different numerically, failure to investigate this further could mask important trends, sensitivities, and individual results. Recall that CPH makes clear predictions at the group and at the individual L2 learner level. And so, aggregate analyses without further consideration can inadvertently mask important individual performances.

I label these methodological flaws as they relate most closely to problems internal to particular methodological protocols and, as such, are more easily malleable to modification. They are, nonetheless, very serious confounds that genuinely question the reliability of any claims based on data subject to these types of methodological shortcomings.

Long is prudent and far-sighted in being concerned about these possible confounds. He effectively shows that many contradictory findings across studies can be explained away by considering the feasible inadequacies he highlights. All SLA researchers must share in his concern as, despite our differences, we all seek to accomplish the same goal of accurately explaining in a principled and reliable manner linguistic acquisition in adulthood. Taken together, these nine points indeed shed doubt on much of the evidence cited as being counter-evidence to the CPH (see Long 2005 for a detailed review of how he applies these nine points to dozens of specific studies). However, these nine points do not come to bear on some robust evidence provided by studies within the generative tradition of SLA, namely, the demonstration of true POS knowledge in adult L2 grammars. It is important to disclose that Long (2005) did not suggest per se that his nine points could apply to these demonstrated cases insofar as he did not address such studies at all, despite the fact that many were available at the time. Spear-headed by Laurent Deydtspotter, Rex Sprouse and colleagues for over a decade, there is today no shortage of evidence suggesting that adult learners acquire sophisticated L2 syntax and related semantic entailments

that could not have been acquired via access to input alone. Any claim that there is a critical/sensitive period for syntax makes the prediction that adult learners cannot acquire such knowledge. In the next section, I will review in detail some of these studies and the evidence they provide. I will take the position that L2 POS evidence is unassailable evidence that syntax and semantics do not suffer from critical/sensitive periods.

#### *4. Counter-Evidence to the Critical Period Hypothesis That Is Not Problematic*

It is important to acknowledge that not all SLA researchers share the same idea of what linguistic universals are. Some take the position that typological approaches to linguistic universals and markedness are explanatorily privileged over approaches assuming domain-specific and innate principles of a UG (see Eckman 2004). Calling attention to related significant differences in what would thus constitute a difference of 'external' and 'internal' universals, White points out that researchers can agree about the 'general nature of the SLA research enterprise without accepting arguments for a domain specific UG and that many SLA researchers from a 'variety of perspectives share objections to explanations couched in terms of implicational universals, precisely because these universals are defined and identified in external rather than internal terms' (2004: 705). And so, when I speak of universals herein, I am referring precisely to internal universals or those that would be provided to the learner gratis via whatever genetic linguistic endowment humans are born with.

Under such assumptions, let us also agree that if the CPH is correct, it essentially states that adults lose access to linguistic universals and primitives, making the process of post-critical period acquisition reliant on domain-general learning mechanisms and thus necessarily different from how children acquire language. And so, a logical question emerges: how can adult L2 grammars, despite observable differences, be so good if language acquisition for adults is an entirely explicit, non-encapsulated process? There are two common and plausible factors that couple together to seemingly answer this question adequately. First, adult L2 learners by definition have an L1 grammar against which they can make initial hypotheses about the target L2. Of course, this grammar is UG-constrained. Also, adults are equipped with a fully developed cognitive system, which provides them with a number of sophisticated problem solving and learning strategies/mechanisms. These two entities can couple together to explain much of the native behavior of L2 grammars. While adult cognitive learning strategies can adequately account for the apparent knowledge of some new L2 syntax (which would mean that despite apparent knowledge, the mental representation for L2 learners is different than that of L1 learners), such learning can only be effective in the case that the input provides direct data for its acquisition. That is, a strict interpretation of the CPH for SLA predicts that L2 POS knowledge should never surface in adult L2 acquisition

because access to internal linguistic universals, which provide learners with such linguistic reflexes, has arrested. As a result, L2 POS knowledge constitutes unassailable counter-evidence for theories claiming critical/sensitive periods for syntax and semantics. In the remainder of this section, I will discuss in detail some of the many studies that attest to L2 POS effects, claiming that Long's (2005) nine points do not apply to these studies and that they therefore provide robust counter-evidence to some of the claims of the CPH.

#### 4.1. THE LOGICAL PROBLEM OF SECOND LANGUAGE ACQUISITION AND ITS RELATIONSHIP TO THE CRITICAL PERIOD HYPOTHESIS

As is the case with all scientific endeavors, SLA hypotheses are subject to *lex parsimoniae*, which is to say, any proposal should be as unadorned as possible with the least amount of assumptions. As it relates to UG, the burden is on generative grammar to demonstrate why hypothesizing UG is indispensable. In other words, is language acquisition an impossible task without being born genetically pre-programmed with linguistic structures? As it relates to SLA, what constitutes reliable evidence for a continued role (or lack thereof) for UG?

For 50 years or so, generative grammar has maintained that children must be born with a modular mental linguistic subsystem that, being specifically designed for the task of language acquisition, is independent from other cognitive systems in the sense of informational encapsulation. Among other benefits, hypothesizing a system of internal linguistic universals adequately explains how children come to acquire their L1 so seemingly effortlessly and how they inevitably acquire properties of their L1 that are not available directly from the input they receive. The aforementioned conundrum is known as the logical problem of language acquisition (Chomsky 1959, 1965; see Guasti 2002; Chomsky 2007; Synder 2008 for modern application). Universal Grammar explains how one comes to know POS properties by assuming that these properties simply fall out from universals triggered by their underlying association to features, which are acquired on the basis of their instantiation in the target language lexicon. As such, POS is not only explained by UG, but also serves as the best evidence justifying the existence of UG (cf. Wexler 1991). As POS provides such strong evidence for UG, its extension in adult L2 acquisition must also denote a role for UG in SLA. Nevertheless, a critical/sensitive period for syntax is, in generative terms, tantamount to claiming inaccessibility to UG. This being said, the CPH predicts that there is no logical problem for adult L2 acquisition.

Over the past decade, evidence of L2 POS has mounted (e.g. Dekydtspotter et al. 1997, 1999/2000, 2005; Pérez-Leroux and Glass 1997, 1999; Kanno 1998; Dekydtspotter and Sprouse 2001; Slabakova and Montrul 2003; Slabakova 2006b; Goodin-Mayeda and Rothman 2007). The implication

of such research for the CPH is that syntax and semantics are not subject to a critical/sensitive period. Slabakova (2006a) reviewed an impressive amount of available literature on L2 semantic research and in light of clear evidence maintains that there is no critical period for semantics, even when semantic universals must be accessed via the acquisition of new morphosyntactic features. By extension, then, there is no critical/sensitive period for syntax.

#### 4.2 POVERTY-OF-THE-STIMULUS AS COUNTER-EVIDENCE TO THE CRITICAL PERIOD HYPOTHESIS

As mentioned in Section 4.1, there have been several studies demonstrating L2 POS effects (see White 2003; Slabakova 2006a). For example, earlier studies by Pérez-Leroux and Glass (1997, 1999) and Kanno (1998) demonstrated that L2 learners of null-subject languages whose L1 is not a null-subject grammar show interpretive restrictions on bound variable interpretations in relevant sentences in line with the Overt Pronoun Constraint, a POS principle of grammar instantiated in null-subject grammars only. Laurent Dekydtspotter, Rex Sprouse and colleagues' work have demonstrated that L2 learners come to acquire other semantic POS knowledge that falls out from the acquisition of L2 syntactic properties, such as the process vs. result interpretations of double genitives (Dekydtspotter et al. 1997); tense-dependent interpretations involving speech-time vs. present time understandings of adjectival restrictions of quantifiers (Dekydtspotter and Sprouse 2001); as well as interpretive asymmetries with *Was für* N interrogatives and quantifier scope (Dekydtspotter et al. 2005).

In an effort to demonstrate POS studies on the one hand and the robust counter-evidence to the CPH that they provide on the other, I review two very recent studies reporting L2 POS knowledge: Rothman and Iverson (2008) and Song and Schwartz (forthcoming). In the case of both of these studies, the adult L2 participants began the process of acquisition after the offset of even the most liberal sensitive periods proposals for syntax and semantics (in all cases late teenage years).

##### 4.2.1. Rothman and Iverson (2008)

In a series of articles, Silvina Montrul and Roumyana Slabakova (see Montrul and Slabakova 2003; Slabakova and Montrul 2003) convincingly demonstrated that English learners of L2 Spanish come to acquire POS interpretive properties of grammatical aspect (preterit vs. imperfect), which they contend stem from semantic universals that must be accessed via the acquisition of aspectual morphology (i.e. the formal features encoded within). Specifically, Slabakova and Montrul (2003) demonstrated that advanced and intermediate English learners of L2 Spanish were significantly more accurate on generic and specific subject restricted interpretations regulated by semantic universals than the archetypal habitual and episodic meanings

of the preterit and imperfect, despite the fact that only the latter is explicitly taught in the classroom setting. Maintaining that the data confirm that L2 learners continue to have access to semantic universals and demonstrate knowledge of how these universals interact with movement at the syntax–semantics interface, their data provide counter-evidence to the CPH for syntax and semantics, as this type of knowledge is precisely what the critical period is supposed render impossible (insofar as domain-general learning cannot converge on such knowledge).

Building upon Montrul and Slabakova's seminal work, Rothman and Iverson (2008) have shown that adult English learners of L2 Portuguese come to acquire another POS semantic entailment related to the acquisition of aspectual morphology, namely, an obligatory [ $\pm$ accidental] construal and related restrictions on interpretation between the preterit and imperfect in sentences with adverbial quantification (including available subject DP interpretations).

The canonical readings of the preterit and imperfect respectively are episodic and habitual/progressive. With adverbial quantification, however, it has been argued that this contrast is essentially neutralized (Bonomi 1997), with the sentence taking the reading of the adverbial quantifier (i.e., a sentence with an adverbial quantifier with universal force, such as 'always,' is necessarily understood as characterizing even if the preterit is used). Lenci and Bertinetto (2000) and Menéndez-Benito (2002) challenged Bonomi's assertion based on the fact that perfective/imperfective forms are not interchangeable (i.e., the contrast is not neutralized) under adverbial quantification in context with, for example, expectative phrases (*sempre que*), with generic adverbials (*normalmente, a menudo*) and durational phrases (*durante cuatro semanas*), such as in (1) and (2).

- (1) *Sempre que eu fui à universidade, estudei na biblioteca.*  
Always that I go-1P-PAST-PFV to the university,  
*pro study-1P-PAST-PFV in the library*  
'Whenever I went to the university, I **ended up**  
studying in the library.'
- (2) *Sempre que eu ia à universidade, estudava na biblioteca.*  
Always that I go-1P-PAST-IMP to the university,  
*pro study-1P-PAST-IMP in the library*  
'Every time I went to the university, I studied at the library.'

While in sentences of the type (1) and (2), both the preterit and imperfect clearly indicate that the event of *going to the university* and *studying in the library* are generalizations of sorts, it would not be accurate to say that they are semantically equivalent either.<sup>7</sup> In sentences with adverbial quantification like (1) and (2), the preterit is only felicitous, and in fact expected, with a highly restricted subset of contexts that clearly denote an accidental generalization (note the English translation differences). Conversely, adverbially quantified imperfective sentences represent the default (i.e., non-accidental)

characterizing reading, which unlike sentences of type (1), are felicitous without a specific context.

Related to this is the fact that only perfective sentences with adverbial quantifiers block the kind-referring reading of the subject DP (Menéndez-Benito 2002), which is otherwise available as a choice with definite DPs in Portuguese along with a group-denoting reading, as in (3)–(5).

- (3) *Sempre que os nômades tinham fome, caçavam lebres.*  
 Always that the nomads have-3PL-PAST-IMP hunger, *pro* hunt-3PL-PAST-IMP hares  
 ‘Whenever the nomads were hungry, they would hunt hares.’
- (4) *Sempre que os nômades tiveram fome, caçaram lebres.*  
 Always that the nomads have-3PL-PAST-PFV hunger, *pro* hunt-3PL-PAST-PFV hares  
 ‘Whenever the nomads were hungry, they wound up hunting hares.’
- (5) *Se os nômades tiveram/tinham fome, caçaram/caçavam lebres.*  
 If the nomads have-3PL-PAST-PFV/have-3PL-PAST-IMP hunger, *pro* hunt-3PL-PAST-PFV/hunt-3PL-PAST-IMP hares  
 ‘If the nomads were hungry, they hunted/would hunt hares.’

Whereas imperfect adverbially quantified sentences, as in (3), and non-adverbially quantified preterit and imperfect sentences, as in (5), retain both types of subject DP readings, only a group-denoting reading is available for adverbially quantified perfective sentences, as in (4). Menéndez-Benito suggests that the unavailability of the kind-denoting reading in adverbially quantified perfective sentences is due to the semantically entailed [ $\pm$ accidental] distinction obtained with adverbial quantification. In other words, the blocking of the kind-denoting reading follows from the accidental nature of these types of sentences, as ‘in all the instances where *x* was hungry, *x* hunted hares’ is predictable of a regular individual or group of individuals, but not of an entire kind.

Employing two types of interpretation tasks (scalar context judgment tasks) with 17 highly advanced learners of Brazilian Portuguese, Rothman and Iverson (2008) showed that these learners acquired the obligatory [ $\pm$ accidental] semantic nuances between adverbially quantified preterit and imperfect sentences inclusive of the kind-reading restriction on subject DPs for preterit sentences with adverbial quantification. In fact, at the individual and group levels, they performed exactly like native speakers on both experiments (i.e., with no statistical differences). Rothman and Iverson did not claim that these learners were near-natives (simply that they were advanced) and whether or not they had reached a steady-state for L2 Portuguese is irrelevant in light of the fact that they demonstrated clear mastery of the domain under investigation and importantly across different tasks. Each of the participants started learning Portuguese well past the end of the reputed critical/sensitive period for L2 syntax and morphology (after age 18 at the earliest).

As was the case with Montrul and Slabakova's work, Rothman and Iverson argued that such knowledge simply obtains (i.e., is semantically entailed) as a result of acquiring the associated morphosyntactic aspectual features encoded in preterit and imperfect morphology. Crucially, in light of the inherent intricacy to this very specific and subtle semantically entailed nuance (this is true for child learners as well), it is impossible for the [ $\pm$ accidental] interpretive distinction between perfective and imperfective aspect with adverbial quantification only to be inducted via domain-general learning. The fact that this distinction was acquired and reliably restricts relevant L2 interpretations must mean that a new L2 morphosyntactic feature (the [-perfective] feature of imperfect morphology absent from the L1 English) was acquired after the so-called critical/sensitive period for syntax. Thus, the data provide counter-evidence to the CPH for syntax and related semantics as this is a *prima facie* example of what should be indefinitely unacquirable if there is a critical period for syntax; adult L2 learners simply have no recourse to acquire such knowledge.

#### 4.2.2. Song and Schwartz (forthcoming)

Examining Song and Schwartz (forthcoming) is especially interesting not only because their study provides yet another example of adult L2 success with POS properties, but due to the fact that they report data from a study testing L1 children as well as L2 adults and children learners of Korean, comparing their performances against a native adult Korean control. Such an exhaustive methodology that uses the same exact testing instruments and protocols to test L1 child as well as child and adult L2 knowledge is quite rare (but see Unsworth 2005a,b), despite the fact that maintaining such methodological variables constant provides a more reliable manner through which one can pinpoint similarities and true differences across these groups. Studying L2 children is extremely important, because like L2 adults they come to the process of L2 acquisition with knowledge of an L1 grammar, which if transferred might provide insight into some differences from L1 child developmental patterns that might be similar to adult L2 learners (cf. Schwartz 2003; Unsworth 2005a,b).

Song and Schwartz test for a POS property involving *wh*-constructions in Korean. Although Korean is a *wh*-in-situ language, it generally allows for *wh*-phrase scrambling as an option, although in most cases scrambling is simply a possibility, which is to say, it is not obligatory. However, licensed by negation in the context of negative polarity items (NPI) *wh*-phrase scrambling in *wh*-questions becomes obligatory. Song and Schwartz offer the following example, suggesting that the fact that a *wh*-question reading (as opposed to the available yes/no question reading) in (6a) is blocked exemplifies an 'Intervention Effect' (Beck and Kim 1997), which they claim is a *prima facie* evidence of a POS property. Importantly, Korean input does not provide sufficient evidence of the subtlety to this restriction, the difficulty of which is further compounded by the fact that (6a) is not entirely illicit

insofar as it maintains a yes/no question interpretation. Moreover, English is not a *wh*-in-situ language, does not allow for scrambling, and this Intervention Effect restriction is not explicitly taught to adult learners.

(6a) SOV (Non-scrambled)

<i>*Amwuto</i>	<i>mwues-ul</i>	<i>mek-ci</i>	<i>anh-ass-ni?</i>
Anyone	what-ACC	eat-ci	NEG-PAST-Q
'Did no one eat something?' *'What did no one eat?'			

(6b) OSV (Scrambled)

<i>Mwues-ul</i>	<i>amwuto</i>	<i>mek-ci</i>	<i>anh-ass-ni?</i>
What-ACC	anyone	eat-ci	NEG-PAST-Q
'What did no one eat?'			

Song and Schwartz report on three experiments with complimentary protocols designed to see if Korean L1 children, English adult and child L2 learners of Korean perform similarly to a native adult Korean control, showing knowledge that in Korean *wh*-constructions, scrambling, as in (6b), becomes obligatory to obviate the NPI-context-induced Intervention Effect. Crucially, these experiments test to see if these same learners also have knowledge that the only available interpretation of *wh*-phrases in non-scrambled variants of these same NPI-context questions is limited to *wh*-indefinites [i.e., the yes/no type interpretation as in 'Did no one eat something?' of (6a)]. Elicited productions demonstrated that all L1 Korean adults/children, all L2 adults, and many (but not all) L2 children do not scramble *wh*-phrases in positive *wh*-questions or negative non-NPI-context *wh*-questions and that all L1 adults/children and some L2 adults/children scramble *wh*-phrases in negative NPI-context *wh*-questions with very little variation. A separate judgment acceptability task confirmed these results across the groups while an independent truth-value judgment task demonstrated that Korean L1 children as well as high-proficiency L2 adults and children do not statistically differ from the adult native controls with respect to relevant interpretation of *wh*-phrases (i.e. (6a) vs. (6b)).

Song and Schwartz conclude that their data reveal a 'fundamental similarity' between children and adults in the context of scrambling and related restrictions of interpretation of *wh*-questions with negative polarity items. Insofar as this property embodies a POS, the fact that all groups seem to be equally successful in overcoming this learnability problem indicates that adults continue to have access to universal linguistic knowledge, assumed to be the source that fills in the apparent gap between the input and the ensuing restrictions. Thus, this study provides further evidence against the CPH for L2 syntax and semantics.

## 5. Discussion

Although not all researchers agree with the notion of POS,<sup>8</sup> the linguistic facts described by POS studies are incontrovertible insofar as they accurately

describe and explain native speaker intuitions of properties that are not available from the input. A UG/POS approach is explanatorily the most satisfactory, unless of course an alternative theoretical account is able to adequately accomplish the following: (i) demonstrating how such linguistic knowledge is acquired from exposure to input that is underdetermined without UG (or whatever one labels the system of linguistic universals), (ii) demonstrating how available input provides evidence for the acquisition of such subtleties, essentially disposing of the necessity of proposing a genetic linguistic endowment, or (iii) demonstrating how domain-general learning for adults is able to provide such knowledge that is provided by domain-specific learning for children. If any of the following can be done and meet the rigors of experimental and theoretical scrutiny, then this would have many far-reaching implications for L1 and L2 acquisition. In the context of the present discussion, it would nullify the *prima facie* evidence that L2 POS effects have in contra the CPH. At present, however, there is no reasonable way to account for such L2 knowledge without assuming continuity in accessibility to universal linguistic knowledge, precisely what the CPH claims becomes inaccessible after the critical/sensitive period (for an in-depth discussion and demonstration of how these properties meet all criteria for POS status, see Rothman and Iverson 2008).

It is important to note that no one denies that a cohort of adult L2 learners who have had good target language exposure and the benefit of significant time can be quite successful in the task of L2 language learning, sometimes even achieving true native-like abilities. Theories maintaining that the CPH applied to SLA is accurate have provided tenable accounts of how language learning occurs for the typical good L2 learner, whereby a coupling of the transferred L1 grammar, which was constructed implicitly by whatever mechanisms are assumed by different approaches to permit implicit linguistic learning, and adult domain-general learning results in what appears on the surface to be relatively good (e.g., Bley-Vroman 1989; Ullman 2001; Dekeyser 2003; Paradis 2004). It must also be clearly stated that there is little doubt that domain-general learning could do much of what these accounts suggest, but there would be significant limitations to what these grammars could and could not contain. In fact, it is virtually impossible to differentiate between domain-general and domain-specific knowledge for certain properties. For example, while it is assumed that domain-specific mechanisms (morphosyntactic features) aid children in learning whether their language is a *wh*-in-situ language or not (whether there is *wh*-movement and the subsequent instantiation of subjacency restrictions or not), it would be difficult to claim that the loss of domain-specific linguistic mechanisms (the inability to acquire new L2 features) would mean that Chinese learners of L2 English could not learn that English, unlike Chinese that is a *wh*-in-situ, requires *wh*-movement. The facts of L2 studies over the past 20 years or so (and mere observation of relevant L2 learners) show that such an expectation is untenable, as Chinese learners of L2

English clearly form questions with what appears to be *wh*-movement on the surface. Notwithstanding, this observation does not really provide robust evidence that Chinese learners of L2 English arrived at such knowledge like we assume English children do (see Hawkins 2005; Hawkins and Hattori 2006). This is true because surface *wh*-movement is unambiguously provided by English input and question formation is explicitly taught. Therefore, such knowledge could be learned explicitly, that is, differently than the case of child acquisition. Crucially, if *wh*-movement is learned by such learners in a domain-general manner, there is a prediction of developmental and ultimate attainment limitations. Developmentally, it is predicted that the related properties that are dependant on the instantiation of *wh*-movement must be learned on a one-to-one basis. In terms of ultimate attainment, the prediction is that related POS properties, in the present case knowledge of relevant subjacency restrictions on movement, will never be acquired to a level of virtual invariability (or optionality). There is some evidence that the first prediction holds for some parametric clusters (see Liceras 1997), although there are other interceding variables that can explain these specific differences in developmental patterns without resorting to the conclusion that child and adult acquisition are fundamentally different (see Lardiere 2007 for the case of *wh*-movement). More relevant for the present discussion is the second prediction, which has been proven incorrect via multiple studies and across several languages (see Lardiere 2007). In light of such evidence, it is reasonable to claim that domain general-learning is unable to explain how L2 learners seem to overcome the same learning problem that children have for the acquisition of specific knowledge.

Because the observable facts of L2 acquisition are accepted by virtually everyone, Long (2005: 290) claims that the fact that there is no consensus in terms of how these facts are interpreted with respect to the (un)tenability of the CPH is one of nature-versus-nurture. He maintains that those who disagree with the CPH for particular linguistic modules (which includes people who believe that there could be one for phonology, but, for example, not one for syntax) believe that it has more to do with nurture, in the present case, motivation, poorer quality input, time on task and altered affective status. This is true of many, but certainly not of all.

Generative linguists who claim that there is no critical/sensitive period for syntax do not take the position that environmental differences between L1/L2 are the primary sources to L1/L2 differences, although such a position is not mutually exclusive with what generative linguists assume. It has long been contended that the L1 grammar could be the source of some L2 ultimate attainment representational differences (White 1989; Schwartz and Sprouse 1996) in that specific L1 transfer could create insurmountable learnability problems (e.g., a subset/superset learnability problem). It was once contended that formal linguistic-based models of acquisition did not

need to account for L2 variability if they provided robust evidence that L2 competence was constrained by universal linguistic knowledge different from what could be transferred by L1 (i.e., competence should be the sole concern of linguistic SLA theories; Gregg 1990). More recently, it has been acknowledged that accounting for L2 variability and optionality – especially if we want to suggest that variability is not sufficient evidence to claim that the adult/child acquisition processes are fundamentally different – must form a vital concern for all SLA theories. That is, all SLA theories should provide reasonable accounts of L1/L2 differences. If one takes the position that L2 variability is not always indicative of underlying non-convergence in particular domains, one needs to provide a plausible account for relevant differences. Contemporary generative research has offered such accounts, claiming that the gamut of observable L1/L2 differences can be explicated via processing problems in a broad sense (but see, for example, Hawkins 2005; Tsimpli and Dimitrakopoulou 2007). Very promising research claims that L1/L2 differences in morphosyntax are almost exclusively limited to interfaces, for example, the syntax–morphophonology interface (Prévost and White 2000; Lardiere 2007); syntax–phonology interface (Goad and White 2006); and syntax–pragmatics interface (Sorace 2000; Sorace and Filiaci 2006). Such proposals adequately account for much L1/L2 differences (variability) at very advanced levels of L2 proficiency, demonstrating that apparent differences do not reflect real syntactic deficits.

Taken together, reasonable accounts of L2 variability and POS evidence within syntax and related semantics provide unassailable evidence that there is not a critical/sensitive period for syntax and semantics, simultaneously satisfying theoretical requirements on descriptive and explanatory adequacy. This does not mean, however, that there are not critical/sensitive periods for phonological and morphophonological competences (nor does it mean there are). The evidence reviewed merely refutes the position that there is a critical/sensitive period for syntax and semantics. As mentioned throughout this article, the POS counter-evidence to the CPH does not nullify the concerns that Long (2005) raises. All nine of Long's points apply, to a greater or lesser extent, to the literature he reviewed and beyond. The methodologies of all critical period related L2 studies will benefit greatly from his observations and suggestions as will the field of SLA as a whole once his concerns for controlling and operationalizing particular variables better are successfully addressed. Importantly, the POS studies reviewed herein do not suffer from the concerns Long raises in that: (i) the learners are true adult L2 learners whose age of onset is well past the critical/sensitive period he and others propose for syntax, (ii) problems pertaining to raters and inappropriate L2 speech samples for comparison do not apply to the subjects of these studies, because the evidence is largely based on L2 interpretive knowledge tapped experimentally, (iii) the L1/L2 pairings are varied across studies with consistent L2 POS results, (iv) all procedural

measures are reliable, and (v) the analyses are based on sound linguistic theories, which enable predictions that are falsifiable.

## 6. Conclusion

It is uncontroversial to say that all serious theories of SLA must account for L1/L2 differences in ultimate attainment. The notion that critical/sensitive periods play a crucial role in any definitive explanation of these differences is a logical one; however, like any other good theoretical proposal, such a claim makes predictions that must come to bear under empirical inquiry. I have attempted to show why proposing a critical/sensitive period for syntax is problematic insofar as the predictions it makes for the acquisition of sophisticated syntax and related semantic knowledge do not match what has been demonstrated in recent generative research. Discussing recent research that provides reasonable accounts for L1/L2 differences in a principled and predictable way, it was demonstrated how a sophisticated and fundamentally native-like L2 syntax can harmoniously co-exist with observable variation and optionality, even in highly proficient L2 learners. Any theory that contends or defends a critical/sensitive period for syntax must adequately explain the type of evidence provided by POS studies. While Long's (2005) points are well-informed, well-argued, and shared by many, they do not apply to nor can they explain this particular type of counter-evidence to the CPH. In other words, not all counter-evidence to the CPH is equal in the sense that POS evidence is a preferred type and not all counter-evidence can be explained away by methodological and otherwise limiting issues. Nevertheless, all available evidence must be equally considered and accounted for.

## Short Biography

Jason Rothman is assistant professor of Hispanic Linguistics and Language Acquisition at the University of Iowa. He obtained his PhD from UCLA in 2005 and works primarily in the field of generative second language acquisition, with additional interests in adult multilingualism, heritage language acquisition, and comparative SLA theory epistemology. His research has investigated the acquisition of complex syntax and semantics pertaining to the Determiner Phrase, subjunctive modality, properties of Control, pronominal objects and subjects, as well as grammatical and lexical aspects. Recent articles have appeared or are to appear in *Applied Linguistics*, *EuroSLA Yearbook*, *International Review of Applied Linguistics*, *International Journal of Bilingualism*, *Language Acquisition: A Journal of Developmental Linguistics*, *International Multilingual Research Journal*, *Journal of Pragmatics*, *Hispania*, and *Second Language Research* among others. With Professor Roumyana Slabakova, Professor Rothman is co-director of the University of Iowa Second Language Acquisition Lab <http://www.uiowa.edu/~slalab/index.html>.

## Notes

\* Correspondence address: Jason Rothman, PhD, Assistant Professor in Hispanic linguistics, Department of Spanish and Portuguese, 422 Phillips Hall, University of Iowa, Iowa City, IA 52242, USA. E-mail: jason-rothman@uiowa.edu.

<sup>1</sup> Herein, I conflate the terms implicit/explicit learning with domain-specific and domain-general acquisition. I wish to make it very clear that I am aware of important differences between these terms, although such subtleties are not crucial to the argumentation herein. Nevertheless, I interpret claims of loss of implicit linguistic learning mechanisms in adults as being essentially the same as loss of domain-specific acquisition abilities that would derive from a loss to UG. Implicit or domain-specific learning, as I intend it here, refers to the acquisition of linguistic knowledge and not the learning of it, whereby the former is a passive exercise that obtains via the interaction of input and mental linguistic modules of specific design. And so, if the critical period (or sensitive periods) correlates to the (gradient) loss of accessibility to implicit linguistic mechanism (entirely or in part), then it is predicted that implicit acquisition can no longer take place as it does in the case of child language acquisition.

<sup>2</sup> See, for example, Rothman and Iverson (2007) for why such a position is not supported empirically and issues related to the notion of parametric clusters and the difficulty such a notion imposes for SLA studies.

<sup>3</sup> Poverty-of-the-stimulus properties – grammatical knowledge that is obtained despite a lack of external evidence that would be needed to ‘learn’ such properties – is not an uncontroversial notion. It is fair to say that often the debate stems from misunderstandings as to what researchers intend by the term (cf. Thomas 2002). Although there is considerable disagreement as to several so-called syntactic and morphological POS properties based mostly on counter-evidence to the claim that available input does not provide triggering evidence (see Pullum and Scholz 2002), the properties we review herein and claim to be POS are semantic entailments, which meet the strictest of criteria for POS inclusion. We direct the reader to a special issue of *The Linguistic Review* (volumes 1 and 2 edited by Nancy Ritter 2002) entitled ‘A Review of “The Poverty of Stimulus Argument”’ in which position and commentary papers on both sides of the issue are given as well as Rothman and Iverson (2008) for how this applies to SLA specifically.

<sup>4</sup> It is important to note that by semantics throughout this article, I am herein referring to the mental computation of meaning at the level of the sentence and not necessarily to the lexicon. Crucially, this includes semantic entailment, restrictions on interpretation that fall out from the syntactic computation. Assuming interfaces as described in Rienhart (2006) – submodules of mental linguistic computation such as phonology, syntax, and semantics are considered in part autonomous, but at various points of linguistic computation must interface in the sense that information is integrated across them – most of these properties involve the syntax–semantics interface. It is for this reason that I link syntax and semantics in the manner I do throughout the article relating to the notion of critical/sensitive periods as for the properties we are most interested herein; the same evidence suggests that there is no critical period for either component.

<sup>5</sup> Innate linguistic components here refer to UG or whatever term one uses to describe the language faculty. Subparts of innate linguistic components refer to the loss of some computational properties, such as certain types of formal linguistic features (assuming a minimalist view of syntax) while non-innate elements refer to non-specific linguistic properties that are clearly utilized in language acquisition, whether child or adult, such as working memory, processing capacity.

<sup>6</sup> A subset/superset relationship obtains when, comparatively, one grammar is larger than the other for a given linguistic phenomenon and when the larger grammar subsumes the possibilities of the smaller grammar. For learnability reasons, it is assumed that acquirers must start with the smaller grammar and expand as opposed to assuming the larger grammar and reducing because the input does not provide preemptive-type negative evidence (Manzini and Wexler 1987). This creates an obvious problem in L2 acquisition if learners initially transfer their L1 and for any given property the L1 happens to be a superset grammar to the target L2 (e.g., Schwartz and Sprouse 1996).

<sup>7</sup> See Rothman and Iverson (2008) for further details on how this constitutes a true POS property and how transfer of iterativity from L1 English cannot explain the resulting knowledge.

<sup>8</sup> See Note 2 for issues and suggested sources for more detailed information.

*Works Cited*

- Beck, Sigrid, and Sin-Sook Kim. 1997. On *wh*- and operator scope in Korean. *Journal of East Asian Languages* 6.339–84.
- Birdsong, David. 1999. Whys and why nots of the CPH for second language acquisition. *Second language acquisition and the critical period hypothesis*, ed. by David Birdsong, 1–22. Mahwah, NJ: Lawrence Erlbaum.
- Bley-Vroman, Robert. 1989. What is the logical problem of foreign language acquisition? *Linguistic perspectives on second language acquisition*, ed. by Susan Gass and Jaqueline Schachter, 41–64. Cambridge, UK: Cambridge University Press.
- . 1990. The logical problem of foreign language learning. *Linguistic Analysis* 20.3–49.
- Bonomi, Andrea. 1997. Aspect, quantification and *when*-clauses in Italian. *Linguistics and Philosophy* 20.469–514.
- Chomsky, Noam. 1959. Review of B.F. Skinner's verbal behavior. *Language* 35.26–58.
- . 1965. *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.
- . 2007. Of minds and language. *Biolinguistics* 1.9–27.
- DeKeyser, Robert. 2000. The robustness of critical period effects in second language acquisition. *Studies in Second Language Acquisition* 22(4).499–533.
- . 2003. Implicit and explicit learning. *The handbook of second language acquisition*, ed. by Catherine Doughty and Michael H. Long, 313–48. Malden, MA: Blackwell.
- Dekydtspotter, Laurent, and Rex Sprouse. 2001. Mental design and (second) language epistemology: adjectival restrictions on *wh*-quantifiers and tense in English–French interlanguage. *Second Language Research* 17.1–35.
- Dekydtspotter, Laurent, Rex Sprouse, and Bruce Anderson. 1997. The interpretive interface in L2 acquisition: the process–result distinction in English–French interlanguage grammars. *Language Acquisition* 6.297–332.
- Dekydtspotter, Laurent, Rex Sprouse, and Rachel Thyre. 1999/2000. The interpretation of quantification at a distance in English–French interlanguage: domain–specificity and second language acquisition. *Language Acquisition* 8.265–320.
- Dekydtspotter, Laurent, Rex Sprouse, and Thaddeus G. Meyer. 2005. Was für N interrogatives and quantifier scope in English–German interpretation. *Proceedings of generative approaches to second language acquisition (GASLA) 7*, ed. by Laurent Dekydtspotter, Rex Sprouse and Audrey Liljestrang, 86–95. Somerville, MA: Cascadilla Press.
- Dunkel, Harold B., and Roger A. Pillet. 1957. A second year of French in the elementary school. *Elementary School Journal* 58.142–51.
- Eckman, Fred. 2004. Universals, innateness and explanation in second language acquisition. *Studies in Language* 28(3).682–703.
- Fathman, Ann. 1975. The relationship between age and second language productive ability. *Language Learning* 25.245–53.
- Flege, James Emil. 1987. A critical period for learning to pronounce foreign language? *Applied Linguistics* 8.162–77.
- Flynn, Suzanne, and Gita Martohardjono. 1995. Toward theory-driven language pedagogy. *Second language acquisition theory and pedagogy*, ed. by Fred Eckman, Diane Highland, Peter W. Lee, Jean Mileham and Rita Rutkowski Weber, 45–59. Hove, UK: Erlbaum.
- Franceschina, Florencia. 2005. Fossilized second language grammars. *The acquisition of grammatical gender*. Amsterdam, The Netherlands: John Benjamins.
- Goad, Heather, and Lydia White. 2006. Ultimate attainment in interlanguage grammars: a prosodic approach. *Second Language Research* 22(3).243–68.
- Goodin-Mayeda, C. Elizabeth, and Jason Rothman. 2007. The acquisition of aspect in L2 Portuguese & Spanish: exploring native/non-native performance differences. *Romance languages and linguistic theory 2005*, ed. by Sergio Baauw, Frank Dirjkonigen and Manuela Pinto, 131–48. Amsterdam, The Netherlands: John Benjamins.
- Gregg, Kevin. 1990. The variable competence model of second language acquisition, and why it isn't. *Applied Linguistics* 11.365–83.
- . 1996. The logical and developmental problem of second language acquisition. *Handbook of second language acquisition*, ed. by William C. Ritchie and Tej K. Bhatia, 49–81. San Diego, CA: Academic Press Ltd.

- Guasti, Maria Teresa. 2002. *Language acquisition: The growth of grammar*. Cambridge, MA: MIT Press.
- Han, Zhaohong. 2004. Fossilization in adult second language acquisition. Clevedon, UK: *Multilingual Matters*.
- Hawkins, Roger. 2005. Revisiting Wh-movement: The availability of an uninterpretable [wh] feature in interlanguage grammars. *Proceedings of the 7th generative approaches to second language acquisition conference (GASLA 2004)*, ed. by Laurent Dekdyspotter, Rex Sprouse and Audrey Liljestrang, 124–37. Somerville, MA: Cascadilla.
- Hawkins, Roger, and Cecilia Chan. 1997. The partial accessibility of Universal Grammar in second language acquisition: The failed functional features hypothesis. *Second Language Research* 13.187–226.
- Hawkins, Roger, and Hajime Hattori. 2006. Interpretation of English multiple wh-questions by Japanese speakers, a missing uninterpretable feature account. *Second Language Research* 22.269–301.
- Herschensohn, Julia. 2007. *Language development and age*. Cambridge, UK: Cambridge University Press.
- Hyltenstam, Kenneth. 1992. Non-native features of non-native speakers: On ultimate attainment of childhood L2 learners. *Cognitive processing in bilinguals*, ed. by Richard Jackson Harris, 351–68. Amsterdam, The Netherlands: Elsevier.
- Hyltenstam, Kenneth and Niclas Abrahamsson. 2000. Who can become native-like in a second language? All, some, or none? On the maturational constraints controversy in second language acquisition. *Studia Linguistica* 54.150–66.
- Kanno, Kazue. 1998. Consistency and variation in second language acquisition. *Second Language Research* 14.376–88.
- Krashen, Stephen D. 1985. *The input hypothesis: issues and implications*. London, UK: Longman Press.
- Lardiere, Donna. 2007. *Ultimate attainment in second language acquisition: a case study*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Lee, Dami, and Jacqueline Schachter. 1997. Sensitive period effects in Binding Theory. *Language Acquisition* 6(4).333–62.
- Lenci, Alessandro, and Pier Marco Bertinetto. 2000. Aspect, adverbs and events: Habituality and perfectivity. *Speaking of events*, ed. by James Higginbotham, Fabio Pianesi and Achille C. Varzi, 265–87. Oxford, UK/New York, NY: Oxford University Press.
- Lenneberg, Eric. 1967. *Biological foundations of language*. New York, NY: Wiley.
- Liceras, Juana. 1997. The now and then of L2 growing pains. *EuroSLA '97 proceedings*, ed. by L. Díaz-Rodríguez and C. Perez Vidal, 65–85. Barcelona, Spain: Universitat Pompeu Fabra.
- Long, Mike. 1990. Maturational constraints on language development. *Studies in Second Language Acquisition* 12(3).251–85.
- . 2005. Problems with supposed counter-evidence to the critical period hypothesis. *International Review of Applied Linguistics* 43(4).287–317.
- Manzini, Rita, and Kenneth Wexler. 1987. Parameters, binding theory, and learnability. *Linguistic Inquiry* 18(3).413–44.
- Meisel, Jürgen. 1997. The acquisition of the syntax of negation in French and German: Contrasting first and second language development. *Second Language Research* 13.227–63.
- Menéndez-Benito, Paula. 2002. Aspect and adverbial quantification in Spanish. *Proceedings of the 32nd north eastern linguistics society, GALSA*, ed. by Masako Hirovani. Amherst, MA: The University of Massachusetts.
- Molfese, Dennis. 1977. Infant cerebral asymmetry. *Language development and neurological theory*, ed. by Sidney J. Segalowitz and Frederic A. Gruber, 22–37. New York, NY: Academic Press.
- Montrul, Silvina, and Roumyana Slabakova. 2003. Competence similarities between native and near-native speakers: an investigation of the preterite/imperfect contrast in Spanish. *Studies in Second Language Acquisition* 25.351–98.
- Newport, Elissa. 2002. Critical periods in language development. *Encyclopedia of cognitive science*, ed. by Lynn Nadel. London, UK: Palgrave Macmillan Publishers Ltd./Nature Publishing Group.

- Oyama, Susan. 1976. A sensitive period for the acquisition of a nonnative phonological system. *Journal of Psycholinguistic Research* 5(3).261–83.
- Paradis, Michel. 2004. A neurolinguistic theory of bilingualism. Amsterdam, The Netherlands: John Benjamins.
- Penfield, Wilder, and L. Roberts. 1959. *Speech and brain mechanisms*. New York, NY: Atheneum.
- Pérez-Leroux, Ana Teresa, and William Glass. 1997. OPC effects on the L2 acquisition of Spanish. *Contemporary perspectives on the acquisition of Spanish*, volume 1: developing grammars, ed. by Ana Teresa Pérez-Leroux and William Glass, 149–65. Somerville, MA: Cascadilla Press.
- . 1999. Null anaphora in Spanish second language acquisition: probabilistic versus generative approaches. *Second Language Research* 15.220–49.
- Prévost, Philippe, and Lydia White. 2000. Missing surface inflection or impairment in second language acquisition? *Second Language Research* 16.103–33.
- Pullum, Geoffrey, and Barbara Scholz. 2002. Empirical assessment of stimulus poverty arguments. *The Linguistic Review* 19.9–50.
- Rienhart, Tanya. 2006. *Interface strategies: optimal and costly computations*. Cambridge, MA: MIT Press.
- Ritter, Nancy (ed.) 2002. A review of ‘the poverty of stimulus argument’. Special Issue of *The Linguistic Review* 19(1–2).105–45.
- Rothman, Jason, and Michael Iverson. 2007. Input type and parameter resetting: Is naturalistic input necessary? *International Review of Applied Linguistics* 45(4).285–319.
- . 2008. Poverty-of-the-stimulus and SLA epistemology: Considering L2 knowledge of aspectual phrasal semantics evidence in L2 Portuguese. *Language Acquisition: A Journal of Developmental Linguistics* 15(4).270–314.
- Schachter, Jacqueline. 1996. Maturation and the issue of universal grammar in second language acquisition. *Handbook of second language acquisition*, ed. by William C. Ritchie and Tej K. Bhatia, 159–93. New York, NY: Academic Press.
- Schumann, John. 1978. *The pidginization process: A model for second language acquisition*. Rowley, MA: Newbury House.
- Schwartz, Bonnie. 1986. The epistemological status of second language acquisition. *Second Language Research* 2.120–59.
- . 2003. Child L2 acquisition: Paving the way. *BUCLD 27: Proceedings of the 27th annual boston university conference on language development*, ed. by Barbara Beachley, Amanda Brown and Frances Conlin, 26–50. Somerville, MA: Cascadilla Press.
- Schwartz, Bonnie, and Rex Sprouse. 1996. L2 cognitive states and the full transfer/full access model. *Second Language Research* 12.40–72.
- Scovel, Thomas. 1988. *A time to speak: a psycholinguistic inquiry into the critical period for human speech*. Rowley, MA: Newbury House.
- Singleton, David. 2005. The critical period hypothesis: a coat of many colours. *International Review of Applied Linguistics*, 43.269–85.
- Singleton, David, and Lisa Ryan. 2004. *Language acquisition: the age factor*. Clevedon, UK: Multilingual Matters.
- Slabakova, Roumyana. 2006a. Is there a critical period for semantics? *Second Language Research* 22.302–38.
- . 2006b. Learnability in the L2 acquisition of semantics: a bidirectional study of a semantic parameter. *Second Language Research* 22.498–523.
- Slabakova, Roumyana, and Silvina Montrul. 2003. Genericity and aspect in L2 acquisition. *Language Acquisition* 11.165–96.
- Song, Hyang Suk, and Bonnie Schwartz. forthcoming. Testing the fundamental difference hypothesis: L2 adult, L2 child, and L1 child comparisons in the acquisition of Korean wh-constructions with Negative Polarity Items. *Studies in Second Language Acquisition*.
- Sorace, Antonella. 2000. Syntactic optionality in non-native grammars. *Second Language Research* 16.93–102.
- Sorace, Antonella, and Francesca Filiaci. 2006. Anaphora resolution in near-native speakers of Italian. *Second Language Research* 22.339–68.

- Synder, William. 2008. *Child language: the parametric approach*. New York, NY: Oxford University Press.
- Thomas, Margaret. 2002. Development of the concept of 'the poverty of the stimulus'. *The Linguistic Review* 19.51–71.
- Tsimpli, Ianthi Maria, and Anna Roussou. 1991. Parameter-resetting in L2? *UCL Working Papers in Linguistics* 3.149–69.
- Tsimpli, Ianthi Maria, and Maria Dimitrakopoulou. 2007. The interpretability hypothesis: Evidence from wh–interrogatives in second language acquisition. *Second Language Research* 23.215–42.
- Ullman, Michael. 2001. The neural basis of lexicon and grammar in first and second language: The declarative/procedural model. *Bilingualism: Language and Cognition* 4(2).105–22.
- Unsworth, Sharon. 2005a. Child L2, adult L2, child L1: Differences and similarities. A study on the acquisition of direct object scrambling in Dutch. PhD thesis, Utrecht University Amsterdam.
- . 2005b. On the syntax-semantics interface in Dutch: Adult and child L2 acquisition compared. *International Review of Applied Linguistics* 42(4).173–87.
- Wattendorf, Elise, Birgit Westerman, Daniela Zappatore, Rita Franceschini, Georges Lüdi, Ernst-Wilhelm Radü, and Cordula Nitsch. 2001. Different languages activate different subfields in Broca's area. *NeuroImage* 13.624.
- Wexler, Ken. 1991. On the argument from the poverty of the stimulus. *The Chomskyan turn*, ed. by A. Kasher, 252–70. Cambridge, MA: Blackwell.
- White, Lydia, and Fred Genesee. 1996. How native is near-native? The issue of ultimate attainment in adult second language acquisition. *Second Language Research* 12.233–65.
- White, Lydia. 1989. *Universal Grammar and second language acquisition*. Philadelphia, PA: John Benjamins.
- . 2003. *Second language acquisition and Universal Grammar*. New York, NY: Cambridge University Press.
- . 2004. 'Internal' versus 'external' universals. Commentary on Eckman. *Studies in Language* 28(3).704–6.